MAY 2 1 1988

FEM I 209: 370075

FLOOD INSURANCE STUDY

TOWN OF VANCEBORO, NORTH CAROLINA

CRAVEN COUNTY

AUGUST 4, 1988

Federal Emergency Management Agency

COMMUNITY NUMBER: 370075

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FLOOD INSURANCE STUDY

TOWN OF VANCEBORO,
CRAVEN COUNTY,
NORTH CAROLINA

1.0 INTRODUCTION

1.1 Purpose of Study

This Flood Insurance Study investigates the existence and severity of flood hazards in the Town of Vanceboro, Craven County, North Carolina, and aids in the administration of the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. This study has developed flood risk data for various areas of the community that will be used to establish actuarial flood insurance rates and assist the community in its efforts to promote sound floodplain management. Minimum floodplain management requirements for participation in the National Flood Insurance Program are set forth in the Code of Federal Regulations at 44 CFR, 60.3.

In some states or communities, floodplain management criteria or regulations may exist that are more restrictive or comprehensive than the minimum Federal requirements. In such cases, the more restrictive criteria take precedence and the state (or other jurisdictional agency) will be able to explain them.

This Flood Insurance Study was prepared by compiling existing hydrologic and hydraulic technical and scientific data prepared by the Federal Emergency Management Agency (FEMA) for purposes of the National Flood Insurance Program.

The data were identified as the best available at the time of compilation of this Flood Insurance Study and should depict the general conditions of the flooding sources with relative accuracy. FEMA performed a cursory review and accepted the data as valid for purposes of this Flood Insurance Study and the National Flood Insurance Program. However, if better information is known to exist or has been developed since the date of this report, the information should be immediately forwarded to the Natural and Technological Hazards Division, FEMA, Atlanta, Georgia, for consideration for revision of this study.

1.2 Authority and Acknowledgments

The sources of authority for this Flood Insurance Study are the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973.

The hydrologic and hydraulic analyses for this study were obtained from the Flood Insurance Study for Craven County, North Carolina (Reference 1).

1.3 Coordination

On September 16, 1987, the results of this Flood Insurance Study were reviewed and accepted at a final coordination meeting attended by representatives of the community and FEMA.

2.0 AREA STUDIED

2.1 Scope of Study

This Flood Insurance Study covers the incorporated area of the Town of Vanceboro, Craven County, North Carolina. The area of study is shown on the Vicinity Map (Figure 1).

The areas studied by detailed methods were selected based upon the extent and validity of available existing hydrologic and hydraulic data.

Flooding caused by overflow of Swift Creek and Mauls Swamp was studied in detail.

Approximate methods of analysis were used to study all remaining areas having a potential flood hazard that did not have detailed scientific or technical data available.

These areas included the upstream portions of Swift Creek beginning at a point about 7,500 feet upstream of Streets Ferry Road and the upstream portion of Mauls Swamp beginning at Mill Pond Road.

2.2 Community Description

The Town of Vanceboro is in northern Craven County in east-central North Carolina. The town is approximately 91 miles southeast of the City of Raleigh, North Carolina, and approximately 210 miles east of the City of Charlotte, North Carolina, and is surrounded by the unincorporated areas of Craven County. Vanceboro is served by U.S. Route 17, State Roads 118 and 43, and the Norfolk Southern Railway. The 1980 population of Vanceboro was reported to be 833, a 10-percent increase from the 1970 population of 758 (Reference 2).

Streams draining the town are small with broad marshy floodplains, as the terrain is generally flat. Swift Creek and Mauls Swamp are the major streams draining the town.

The climate of Vanceboro is characterized by mild winters and warm summers. The average annual temperature is 63 degrees Fahrenheit. The average annual precipitation for the region around Vanceboro is 50 inches, with the heaviest rains usually occurring during the summer months (Reference 3).

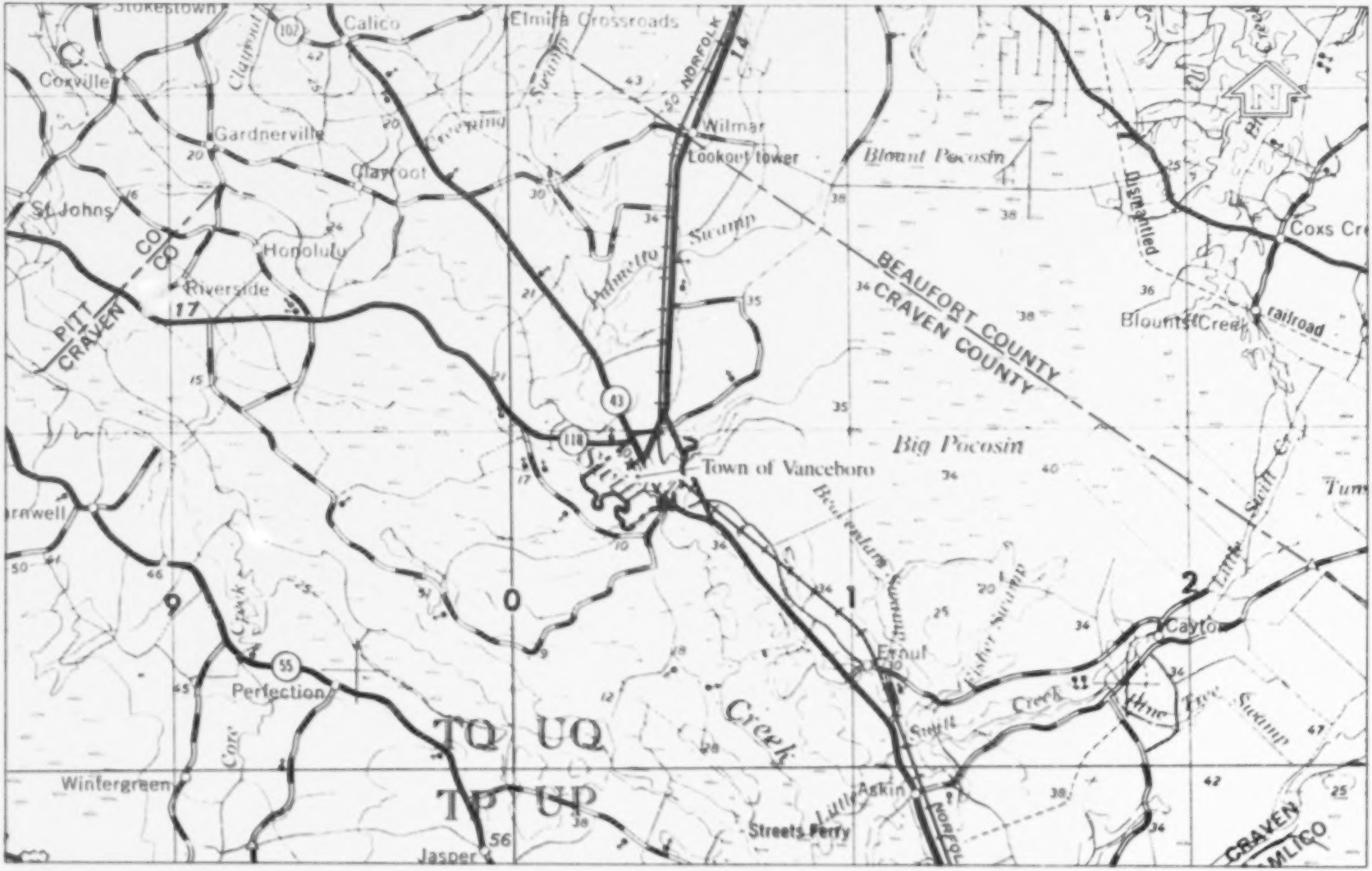


FIGURE 1

FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWN OF VANCEBORO, NC
(CRAVEN CO.)

APPROXIMATE SCALE

3 0 3 6 9 Miles

VICINITY MAP

2.3 Principal Flood Problems

The primary flooding problem in Vanceboro is the overflow of Swift Creek and Mauls Swamp that results from heavy rains.

2.4 Flood Protection Measures

Flood protection measures are not known to exist within the study area.

3.0 ENGINEERING METHODS

For the flooding sources studied in detail in the community, standard hydrologic and hydraulic study methods were used to determine the flood hazard data required for this study. Flood events of a magnitude that are expected to be equaled or exceeded once on the average during any 10-, 50-, 100-, or 500-year period (recurrence interval) have been selected as having special significance for floodplain management and for flood insurance rates. These events, commonly termed the 10-, 50-, 100-, and 500-year floods, have a 10-, 2-, 1-, and 0.2-percent chance, respectively, of being equaled or exceeded during any year. Although the recurrence interval represents the long-term average period between floods of a specific magnitude, rare floods could occur at short intervals or even within the same year. The risk of experiencing a rare flood increases when periods greater than 1 year are considered. For example, the risk of having a flood that equals or exceeds the 100-year flood (1-percent chance of annual exceedence) in any 50-year period is approximately 40 percent (4 in 10), and, for any 90-year period, the risk increases to approximately 60 percent (6 in 10). The analyses reported herein reflect flooding potentials based on conditions existing in the community at the time of completion of this study. Maps and flood elevations will be amended periodically to reflect future changes.

3.1 Hydrologic Analyses

Hydrologic analyses were carried out to establish the peak discharge-frequency relationships for each riverine flooding source studied in detail affecting the community.

Regionalized regression equations developed by the U.S. Army Corps of Engineers (COE) were used to compute the discharges for watersheds that drain less than 200 square miles (Reference 4). Where urbanization within a drainage basin has occurred, the methodology specified in a U.S. Geological Survey (USGS) publication (Reference 5) was used to adjust the discharges derived from the COE report.

Peak discharge-drainage area relationships for the 10-, 50-, 100-, and 500-year floods of each flooding source studied in detail in the community are shown in Table 1.

TABLE 1 - SUMMARY OF DISCHARGES

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (SQ MILES)	PEAK DISCHARGE (CFS) 10-YEAR	50-YEAR	100-YEAR	500-YEAR
MAULS SWAMP at confluence with Swift Creek	219.6	5,011	8,846	10,976	17,074
SWIFT CREEK just upstream of Streets Ferry Road	219.6	5,010	8,845	10,975	17,075

3.2 Hydraulic Analyses

Analyses of the hydraulic characteristics of flooding from the sources studied were carried out to provide estimates of the elevations of floods of the selected recurrence intervals.

Cross sections for the backwater analyses were obtained from field surveys. In some cases, USGS topographic maps (Reference 6) were used to extend surveyed cross sections. All bridges, dams, and culverts were field checked to obtain elevation data and structural geometry.

Locations of selected cross sections used in the hydraulic analyses are shown on the Flood Profiles. For stream segments for which a floodway was computed (Section 4.2), selected cross-section locations are also shown on the Flood Insurance Rate Map.

Channel roughness factors (Manning's "n") used in the hydraulic computations were chosen on the basis of field observations, aerial photographs of the streams and floodplain areas, and the USGS water supply paper, "Roughness Characteristics of Natural Channels" (Reference 7). Roughness values used for the main channels and their tributaries ranged from 0.014 to 0.07, with overbank floodplain roughness values set at 0.12 to 0.2.

Normal depth calculations were used to set the starting water-surface elevation for all the streams studied.

For areas subject to stream overflow, water-surface elevations for floods of the selected recurrence intervals were developed using the COE HEC-2 water-surface profile computer model (Reference 8).

Flood profiles were drawn showing the computed water-surface elevations for floods of the selected recurrence intervals. In cases where the 50- and 100-year flood elevations are close together, due to limitations of the profile scale, only the 100-year profile has been drawn.

The hydraulic analyses for this study are based on the effects of unobstructed flow. The flood elevations shown on the profiles are thus considered valid only if hydraulic structures remain unobstructed, operate properly, and do not fail.

All elevations are referenced to the National Geodetic Vertical Datum of 1929 (NGVD).

4.0 FLOODPLAIN MANAGEMENT APPLICATIONS

The National Flood Insurance Program encourages state and local governments to adopt sound floodplain management programs. Therefore, each Flood Insurance Study provides 100-year flood elevations and delineation of the 100- and 500-year floodplain boundaries and 100-year floodway to assist communities in developing floodplain management measures.

4.1 Floodplain Boundaries

To provide a national standard without regional discrimination, the 1 percent annual chance (100-year) flood has been adopted by FEMA as the base flood for floodplain management purposes. The 0.2-percent annual chance (500-year) flood is employed to indicate additional areas of flood risk in the community. For each stream studied in detail, the 100- and 500-year floodplain boundaries have been delineated using the flood elevations determined at each cross section. Between cross sections, the boundaries were interpolated using topographic maps at a scale of 1:24000 with a contour interval of 2 meters (Reference 6).

The 100- and 500- year floodplain boundaries are shown on the Flood Insurance Rate Map. On this map, the 100-year floodplain boundary corresponds to the boundary of the areas of special flood hazards (Zones A, AE, AH, AO, A99, V, and VE) and the 500-year floodplain boundary corresponds to the boundary of areas of moderate flood hazards. In cases where the 100- and 500-year floodplain boundaries are close together, only the 100-year floodplain boundary has been shown. Small areas within the floodplain boundaries may lie above the flood elevations but cannot be shown due to limitations of the map scale and/or lack of detailed topographic data.

For the streams studied by approximate methods, only the 100-year floodplain boundary was delineated using the Flood Insurance Study for Craven County (Reference 1).

4.2 Floodways

Encroachment on floodplains, such as structures and fill, reduces the flood-carrying capacity, increases the flood heights and velocities, and increases flood hazards in areas beyond the encroachment itself. One aspect of floodplain management involves balancing the economic gain from floodplain development against the resulting increase in flood hazard. For purposes of the National Flood Insurance Program, a floodway is used as a tool to assist local communities in this aspect of floodplain management.

Under this concept, the area of the 100-year floodplain is divided into a floodway and a floodway fringe. The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 100-year flood can be carried without substantial increases in flood heights. Minimum Federal standards limit such increases to 1.0 foot, provided that hazardous velocities are not produced. The floodways in this study are presented to local agencies as minimum standards that can be adopted directly or that can be used as a basis for additional floodway studies.

The floodways presented in this study were computed for certain stream segments on the basis of equal conveyance reduction from each side of the floodplain. Floodway widths were computed at cross sections. Between cross sections, the floodway boundaries were interpolated. The results of the floodway computations are tabulated for selected cross sections and are shown in Table 2, Floodway Data. The computed floodways are shown on the Flood Insurance Rate Map. In cases where the floodway and 100-year floodplain boundaries are either close together or collinear, only the floodway boundary is shown. Portions of the floodways for Mauls Swamp and Swift Creek lie outside the corporate limits.

The area between the floodway and the 100-year floodplain boundaries is termed the floodway fringe. The floodway fringe thus encompasses the portion of the floodplain that could be completely obstructed without increasing the water-surface elevation of the 100-year flood more than 1.0 foot at any point. Typical relationships between the floodway and the floodway fringe and their significance to floodplain development are shown in Figure 2.

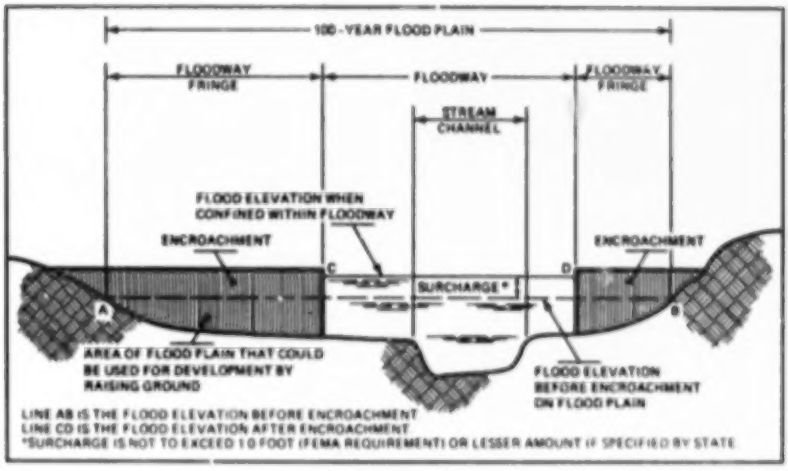

100-YEAR FLOOD PLAIN
FLOODWAY FRINGE
FLOODWAY
FLOODWAY FRINGE
STREAM CHANNEL
FLOOD ELEVATION WHEN CONFINED WITHIN FLOODWAY
ENCROACHMENT
ENCROACHMENT
C
D
SURCHARGE*
A
B
AREA OF FLOOD PLAIN THAT COULD BE USED FOR DEVELOPMENT BY RAISING GROUND
FLOOD ELEVATION BEFORE ENCROACHMENT ON FLOOD PLAIN
LINE AB IS THE FLOOD ELEVATION BEFORE ENCROACHMENT
LINE CD IS THE FLOOD ELEVATION AFTER ENCROACHMENT
*SURCHARGE IS NOT TO EXCEED 1.0 FOOT (FEMA REQUIREMENT) OR LESSER AMOUNT IF SPECIFIED BY STATE

FIGURE 2 - Floodway Schematic

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH[3] (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET/SEC.)	REGULATORY (FEET NGVD)	WITHOUT FLOODWAY (FEET NGVD)	WITH FLOODWAY (FEET NGVD)	INCREASE (FEET)
SWIFT CREEK								
A	675	898	8158	1.1	13.4	13.4	14.2	0.8
B	8265	2830	32,099	0.3	14.6	14.6	15.4	0.8
MAULS SWAMP								
A	100[2]	282	2260	1.4	14.7	14.7	15.7	1.0
B	620[2]	426	4969	0.6	14.8	14.8	15.8	1.0
C	3750[2]	701	5026	0.6	15.5	15.5	16.5	1.0
D	6629[2]	589	4029	0.7	16.3	16.3	17.2	0.9

[1]FEET ABOVE CONFLUENCE OF MAULS SWAMP
[2]FEET ABOVE MOUTH
[3]WIDTH EXTENDS BEYOND CORPORATE LIMITS

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWN OF VANCEBORO, NC
(CRAVEN CO.)

FLOODWAY DATA

SWIFT CREEK—MAULS SWAMP

5.0 INSURANCE APPLICATION

For flood insurance rating purposes, flood insurance zone designations are assigned to a community based on the results of the engineering analyses. These zones are as follows:

Zone A

Zone A is the flood insurance rate zone that corresponds to the 100-year floodplains that are determined in the Flood Insurance Study by approximate methods. Because detailed hydraulic analyses are not performed for such areas, no base flood elevations or depths are shown within this zone.

Zone AE

Zone AE is the flood insurance rate zone that corresponds to the 100-year floodplains that are determined in the Flood Insurance Study by detailed methods. Whole-foot base flood elevations derived from the detailed hydraulic analyses are shown at selected intervals within this zone.

Zone X

Zone X is the flood insurance rate zone that corresponds to areas outside the 100-year floodplain, areas of 100-year flooding where average depths are less than 1 foot, areas of 100-year flooding where the contributing drainage area is less than 1 square mile, and areas protected from the 100-year flood by levees. No base flood elevations or depths are shown within this zone.

6.0 FLOOD INSURANCE RATE MAP

The Flood Insurance Rate Map is designed for flood insurance and floodplain management applications.

For flood insurance applications, the map designates flood insurance rate zones as described in Section 5.0 and, in the 100-year floodplains that were studied by detailed methods, shows selected whole-foot base flood elevations or average depths. Insurance agents use the zones and base flood elevations in conjunction with information on structures and their contents to assign premium rates for flood insurance policies.

For floodplain management applications, the map shows by tints, screens, and symbols the 100- and 500-year floodplains, the floodways, and the locations of selected cross sections used in the hydraulic analyses and floodway computations.

7.0 OTHER STUDIES

A Flood Insurance Study has been published for Craven County, North Carolina (Reference 1) and is in agreement with this study.

8.0 LOCATION OF DATA

Information concerning the pertinent data used in the preparation of this study can be obtained by contacting the Natural and Technological Hazards Division, FEMA, 1371 Peachtree Street, NE., Suite 736, Atlanta, Georgia 30309.

9.0 REFERENCES AND BIBLIOGRAPHY

1. Federal Emergency Management Agency, Flood Insurance Study, Craven County, Unincorporated Areas, North Carolina, May 1987.

2. U.S. Department of Commerce, Bureau of the Census, 1980 Census of Population, Number of Inhabitants, North Carolina, Washington, D.C., February 1982.

3. U.S. Army Corps of Engineers, Wilmington District, Swift Creek, Pitt and Craven Counties, North Carolina, Detailed Project Report, 1963.

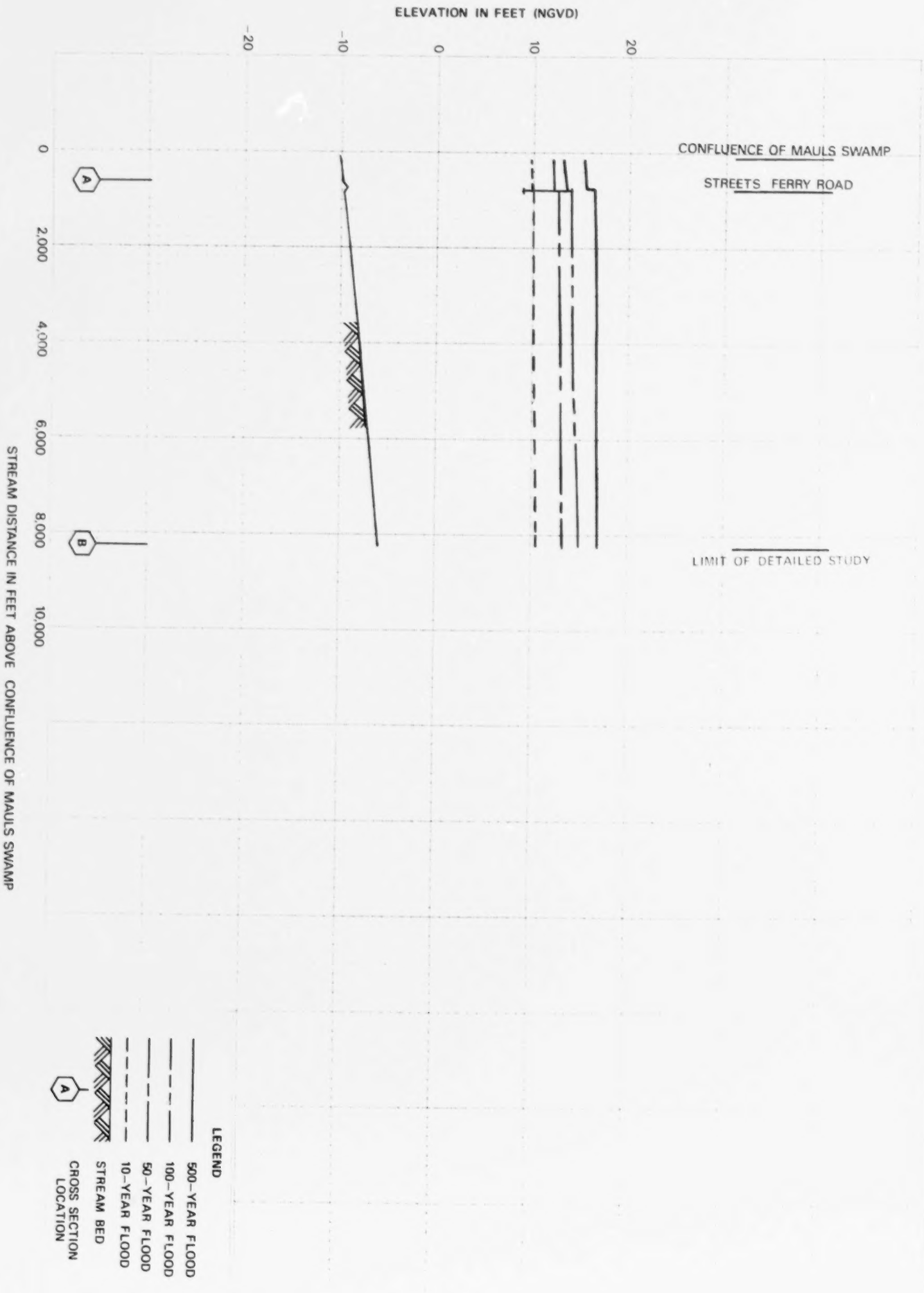
4. ————, Wilmington District, Composite Hydrologic Study of Floods in the Coastal Plain and Piedmont Areas of North Carolina, 1978.

5. U.S. Geological Survey, Effect of Urban Development of Floods in the Piedmont Province of North Carolina, 1972.

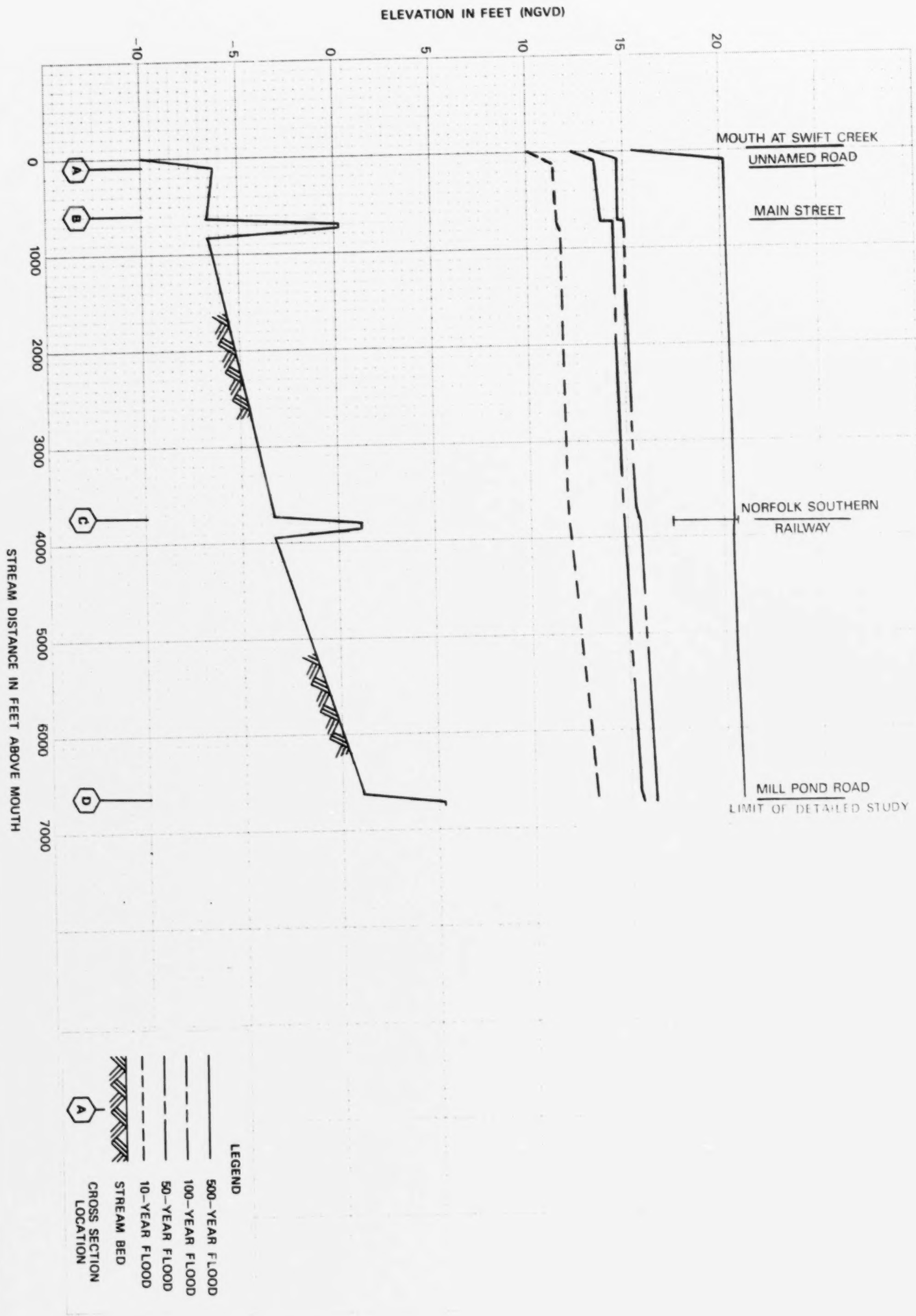
6. ————, 7.5 Minute Series Topographic Maps, Scale 1:24000, Contour Interval 2 Meters: Vanceboro, North Carolina, 1983.

7. ————, Water Supply Paper 1849, Roughness Characteristics of Natural Channels, H. H. Barnes, 1967.

8. U.S. Army Corps of Engineers, Hydrologic Engineering Center, Generalized Computer Program HEC-2, Water-Surface Profiles, Users Manual, November 1976.



01P	FEDERAL EMERGENCY MANAGEMENT AGENCY **TOWN OF VANCEBORO, NC** (CRAVEN CO.)	**FLOOD PROFILES** **SWIFT CREEK**



02P

FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWN OF VANCEBORO, NC
(CRAVEN CO.)

FLOOD PROFILES

MAULS SWAMP